CLAIMS

1. A process for the preparation of a sprayable polymeric material having a fibrous material, comprising:

a) providing a predetermined amount of fibrous material;

b) providing reaction components comprising a polyol and an isocyanate;

c) heating the reaction components;

d) adding the fibrous material to the polyol component, the isocyanate component, or both; and

e) reacting the reaction components, whereby to create the polymeric material.

2. The process of claim 1, further comprising heating the fibrous material to a temperature from about 140°F to 160°F, prior to adding the fibrous material to the reaction components.

3. The process of claim 1, wherein the fibrous material is substantially dry.

4. The process of claim 1, further comprising, prior to adding the fibrous material, pre-wetting the fibrous material to (i) about 10% by volume of the polyol component, (ii) about 10% by volume of the isocyanate component, or (iii) about 10% of both components combined.

5. The process of claim 1, wherein the fibrous material is an aramid, high molecular weight polyethylene, fullerene, nanotube, ceramic fiber, or mixtures thereof.

6. The process of claim 5, wherein the aramid fiber is KEVLAR pulp.

7. The process of claim 1, wherein the predetermined amount of fibrous material is from about 0.5 weight percent to 1.0 weight percent of the total weight of the composition.

8. The process of claim 1, wherein the heating of the reaction components is from about 160°F to 250°F.

9. The process of claim 1, wherein the polyol component and the isocyanate component are provided in a 1:1 ratio by volume.

10. The process of claim 1, further comprising adding water to the polymeric material, whereby to create a matrix of closed cell polyurethane.

11. The process of claim 10, further comprising applying pressure to closed cell polyurethane.

12. The process of claim 1, wherein the adding of the fibrous material to the polyol, the isocyanate, or both, is by mixing, whereby to randomly locate the fibrous material within the polyol, the isocyanate, or both.

13. A process for the preparation of a composite of a sprayable polymer resin having a reinforcing fiber, comprising adding the reinforcing fiber to a first polymeric material solution

and to a second polymeric material solution, reacting the first and second solutions, whereby the reinforcing material is incorporated homogeneously without causing separation during the curing reaction between the first and second polymeric material solutions.

Sub A4 Cont.

14. The process for the preparation of a sprayable polymeric material having a fibrous material, comprising:

a) providing a predetermined amount of fibrous material;

b) providing at least two reaction components, wherein the components contain no volatile organic compounds and are polyurethane, polyester, epoxy, polyurea;

c) heating the reaction components;

d) adding the fibrous material to the polyol component, the isocyanate component, or both; and

e) reacting the reaction components, whereby to create the polymeric material.

15. A restriction free spray nozzle for mixing and spraying a first reactive polymeric material with a second reactive polymeric material, at least one of the reactive polymeric materials containing a fibrous material, forming a two part polymer comprising: a restriction free check valve without springs, a hose for conveying said first and second polymeric materials to a ball valve, said nozzle spraying a mixture of the first and second materials from said check valve onto a surface.

16. The spray nozzle of claim 15, wherein the fibrous material is an aramid, high molecular weight polyethylene, fullerene, nanotube, ceramic fiber, or mixtures thereof.

17. The spray nozzle of claim 16, wherein the aramid fiber is KEVLAR pulp.

18. A reinforced structure comprising a first and second layer of polyurethane resin containing from about 0.5 to 1.0% by weight of a fibrous material sandwiching a layer of polyurethane foam containing from about 0.5 to 1.0% by weight of a fibrous material.

19. The reinforced structure of claim 18, wherein the fibrous material is an aramid, high molecular weight polyethylene, fullerene, nanotube, ceramic fiber, or mixtures thereof.

20. The reinforced structure of claim 19, wherein the aramid fiber is KEVLAR pulp.

21. The reinforced structure of claim 18, wherein the first and second layers of polyurethane resin are about 100 mils.

22. The reinforced structure of claim 18, further comprising a panel between said first layer of polyurethane foam and a second layer of polyurethane foam.

23. A method of coating a reinforcement structure having a top and a bottom side with a polyurethane composition comprising:

a) providing a predetermined amount of fibrous material;

b) providing reaction components comprising a polyol and an isocyanate;

c) heating the reaction components;

d) mixing the fibrous material with the polyol, the isocyanate, or both;

e) reacting the reaction components, whereby to create a polymeric resin;

f) spraying the top of the reinforcement structure with a polymeric foam containing a second fibrous material; and

g) spraying the top of the reinforcement structure with the polymeric resin, prior to cure of the polymeric resin.

24. The method of claim 23, further comprising spraying the bottom side of the reinforcement structure with the polymeric foam.

25. The method of claim 24, further comprising spraying the bottom side of the reinforcement structure with the polymeric resin.

26. The method of claim 23, wherein the step of reacting the reaction components is performed in an inert atmosphere.

27. The method of claim 23, wherein the first and second fibrous materials are aramid, high molecular weight polyethylene, fullerene, nanotube, ceramic fiber, or mixtures thereof.

28. The method of claim 27, wherein the aramid fiber is KEVLAR.

29. The method of claim 23, wherein the fibrous material is from about 0.5% to 1.0% by weight of the polymeric resin.

30. The method of claim 23, wherein the heating is from about 160°F to 250°F.

31. The method of claim 23, wherein the polyol and the isocyanate are provided in about a 1:1 ratio by volume.

32. The method of claim 23, further comprising applying pressure to the reaction components.

33. The method of claim 23, wherein the reinforcement structure is sprayed with about 100 mils of the polymeric resin.

34. A sprayable polyurethane composition comprising from about 0.5% to 30% by weight of a fibrous material, wherein the polyurethane is solvent-free and is the reaction product of a polyol and a polyisocyanate.

35. The composition of claim 34, wherein the fibrous material is an aramid, high molecular weight polyethylene, fullerene, nanotube, ceramic fiber, or mixtures thereof.

36. The composition of claim 35, wherein the aramid fiber is KEVLAR pulp.

37. A flexible liner comprising:

a) a porous geotextile fabric; and

b) a polyurethane composition comprising a fibrous material sprayed over said porous geotextile fabric, whereby to form a monolithic membrane with the geotextile fabric.

38. The flexible liner of claim 37, wherein the polyurethane is sprayed at about 100 mils.

39. The flexible liner of claim 37, wherein the fibrous material is an aramid, high molecular weight polyethylene, fullerene, nanotube, ceramic fiber, or mixtures thereof.

40. The flexible liner of claim 37, wherein the aramid fiber is KEVLAR pulp.

41. A process for the preparation of a flexible liner comprising:

a) providing a sheet of a porous geotextile fabric having a perimeter edge; and

b) spraying a polyurethane composition comprising a fibrous material onto said porous geotextile fabric, whereby to form a monolithic membrane with the geotextile fabric.

42. The process of claim 41, wherein the spraying of the polyurethane is about 100 mils.

43. The process of claim 41, wherein the fibrous material is an aramid, high molecular weight polyethylene, fullerene, nanotube, ceramic fiber, or mixtures thereof.

44. The process of claim 43, wherein the aramid fiber is KEVLAR pulp.

45. The process of claim 41, further comprising providing an object to be lined.

46. The process of claim 45, further comprising attaching the geotextile fabric to the object with an adhesive, prior to spraying the polyurethane composition, wherein the perimeter edge of the geotextile fabric is not tacked to the object to allow gas to escape.